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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/623,395	07/18/2003	Michael Z. Hu	1066.0	4658
24298	7590	09/09/2005	EXAMINER	
UT-Battelle, LLC Office of Intellectual Property One Bethal Valley Road 4500N, MS-6258 Oak Ridge, TN 37831			KUGEL, TIMOTHY J	
			ART UNIT	PAPER NUMBER
			1712	

DATE MAILED: 09/09/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/623,395	Applicant(s) HU, MICHAEL Z.	
	Examiner Timothy J. Kugel	Art Unit 1712	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-11 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-11 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 18 July 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☒ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|--|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>10/6/03</u> . | 6) <input type="checkbox"/> Other: ____ |

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DETAILED ACTION

1. Claims 1-11 are pending as filed on 18 July 2003.

Oath/Declaration

2. Applicant has not given a post office address anywhere in the application papers as required by 37 CFR 1.33(a), which was in effect at the time of filing of the oath or declaration. A statement over applicant's signature providing a complete post office address is required.

Drawings

3. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description: FIG. 9a, Reference Characters A, B and C. Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the specification to add the reference character(s) in the description in compliance with 37 CFR 1.121(b) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

4. The disclosure is objected to because of the following informalities:

The reference to US Application Serial No. 09/397,814 should be amended to reference US 6,806,295 as that application has now issued.

The phrase "A stearic dispersant and an organic solvent is then added..." should be A stearic dispersant and an organic solvent are then added..."

The acronyms SEM, HTXRD, DTA/TGA and RTXRD should be defined at their first usage.

Regarding the citation of the following references: Bhattacharya et al., 1996; Bhattacharya et al., 1996b; Hu et al., 2000a; Navio et al., 1992a and Navio et al., 1992b; the specification should be amended to better indicate to which of the non-patent literature documents listed on the Information Disclosure Statement filed 6 October 2003 the citation refers.

Appropriate correction is required.

5. Regarding the references to Chen et al., 1999; Cerqueria et al., 1998 and Hu et al., 1999, the incorporation of essential material in the specification by reference to an unpublished U.S. application, foreign application or patent, or to a publication is improper. Applicant is required to amend the disclosure to include the material incorporated by reference, if the material is relied upon to overcome any objection, rejection, or other requirement imposed by the Office. The amendment must be accompanied by a statement executed by the applicant, or a practitioner representing the applicant, stating that the material being inserted is the material previously

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incorporated by reference and that the amendment contains no new matter. 37 CFR 1.57(f).

6. Regarding the citation of the following references: Chen et al., 1999; Cerqueria et al., 1998; Cerqueria et al., 1998; Hirano et al., 1991; Hu et al., 1999; Park et al., 1997; Moon et al., 1995; Bianco et al., 1998; Stubicar et al., 1999; Navio 1993; Macias et al., 1992; Bhattacharya et al., 1994; Isobe et al., 1994; Bonhomme-Coury et al., 1994; McHale and Roth, 1986 and Leoni et al., 2001; these references have been construed to be to the corresponding non-patent literature documents listed on the Information Disclosure Statement filed 6 October 2003.

Double Patenting

7. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

8. Claims 1-7, 10 and 11 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1, 2, 4-7, 9, 13, 15-17, 19 and 21-24 of U.S. Patent No. 6,806,295 (Hu '295 hereinafter).

Hu '295 claims a process wherein an aqueous solution of a zirconium chloride salt and a titanium chloride salt of a total concentration of about 0.005 to about 0.5 M are mixed, adding a dispersant—including 0.002 g/cm³ hydroxypropyl cellulose as taught in the disclosure (Column 6 Lines 46-52, See *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970)), adding an organic solvent, including those selected from the group consisting of methanol, ethanol, isopropanol, n-propanol, tert-butyl alcohol, n-butanol, and glycerol in ratios of from 0.1/1 to 10/1 solvent/water as taught by the disclosure (Column 6 Lines 32-44, See *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970)) , and incubating the mixture in an oven at temperatures of from about 20°C to about 120°C and times of from about 1 minute to 72 hours as taught in the disclosure (Column 2 Lines 54-62, See *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970)).

Since Hu '295 teaches the same process and composition as claimed, one of ordinary skill in the art at the time the invention was made would have expected that the spherical nature, interparticle nanostructure and properties of the Hu '295 composition would inherently be the same as claimed.

9. Claims 8 and 9 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1, 2, 4-7, 9, 13, 15-17, 19 and 21-24 of Hu '295 in view of Hu, Low-Tech Route Yields High-Tech Ceramic Nanopowders, *High-Tech Materials Alert*, Vol. 15, No. 2, February 1998 (Hu 1998 hereinafter).

Hu '295 claims a process wherein an aqueous solution of a zirconium chloride salt and a titanium chloride salt of a total concentration of about 0.005 to about 0.5 M are mixed, adding a dispersant—including 0.002 g/cm³ hydroxypropyl cellulose as taught in the disclosure (See *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970)), adding an organic solvent, including those selected from the group consisting of methanol, ethanol, isopropanol, n-propanol, tert-butyl alcohol, n-butanol, and glycerol in ratios of from 0.1/1 to 10/1 solvent/water as taught by the disclosure (See *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970) , and incubating the mixture in an oven at temperatures of from about 20°C to about 120°C and times of from about 1 minute to 72 hours as taught in the disclosure (See *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970) as detailed above.

Since Hu '295 teaches the same process and composition as claimed, one of ordinary skill in the art at the time the invention was made would have expected that the spherical nature, interparticle nanostructure and properties of the Hu '295 composition would inherently be the same as claimed.

Hu '295 does not disclose expressly the use of a microwave oven.

Hu 1998 discloses a similar process using a microwave oven to incubate the composition (¶3).

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to use a microwave oven as taught by Hu 1998 in the Hu '295 process. The motivation to do so would have been to speed-up the process (Hu 1998 ¶3).

Claim Rejections - 35 USC § 102 and/or § 103

10. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

12. Claims 1-3, 5, 7, 10 and 11 rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Hu et al., Sol-Gel and Ultrafine Particle Formation via Dielectric Tuning of Inorganic Salt-Alcohol-Water Solutions, *Journal of Colloid and Interface Science*, 222, 20-36, 2000 (Hu 2000 hereinafter).

Hu 2000 teaches a process of producing ZrO₂-TiO₂ particles (Page 21 ¶1) comprising adding hydroxypropyl cellulose (Abstract) to an alcohol-water solution— including alcohols selected from the group consisting of methanol, ethanol, isopropanol, n-propanol, the butanols, and glycerol at ratios of up to 1.5:1 alcohol:water (Table 2

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Page 23 and Page 33 ¶2)—of inorganic salts—including ZrOCl_2 (Page 21 ¶ 7)—at total salt concentrations of from 0.05 M to 0.1 M (Page 29 ¶1) and incubating the mixture in an oven at from room temperature to 120°C for 1 to 48 hours (Page 21 ¶5).

Since Hu 2000 teaches the same process and composition as claimed, one of ordinary skill in the art at the time the invention was made would have expected that the spherical nature, interparticle nanostructure and properties of the Hu '295 composition would inherently be the same as claimed.

Where applicant claims a composition in terms of a function, property or characteristic and the composition of the prior art is the same as that of the claim but the function is not explicitly disclosed by the reference, the examiner may make a rejection under both 35 U.S.C. 102 and 103. "There is nothing inconsistent in concurrent rejections for obviousness under 35 U.S.C. 103 and for anticipation under 35 U.S.C. 102." *In re Best*, 562 F.2d 1252, 1255 n.4, 195 USPQ 430, 433 n.4 (CCPA 1977).

13. Claim 1 is rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Bhattacharya et al., Sol gel preparation, structure and thermal stability of crystalline zirconium titanate microspheres, *Journal of Material Science*, 31, 267-271, 1996 (Bhattacharya hereinafter).

Bhattacharya teaches a process of producing ZrTiO_4 (Abstract, Page 267 ¶1) microspheres comprising mixing an aqueous solution of a titanium salt with an aqueous solution of a zirconium salt in equimolar ratio and adding a mixture of ethyl-hexanol/surfactant (Page 267 ¶5).

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Since Bhattacharya teaches the same process and composition as claimed, one of ordinary skill in the art at the time the invention was made would have expected that the interparticle nanostructure and properties of the Bhattacharya composition would inherently be the same as claimed.

Where applicant claims a composition in terms of a function, property or characteristic and the composition of the prior art is the same as that of the claim but the function is not explicitly disclosed by the reference, the examiner may make a rejection under both 35 U.S.C. 102 and 103. "There is nothing inconsistent in concurrent rejections for obviousness under 35 U.S.C. 103 and for anticipation under 35 U.S.C. 102." *In re Best*, 562 F.2d 1252, 1255 n.4, 195 USPQ 430, 433 n.4 (CCPA 1977).

14. Claims 1-7, 10 and 11 are rejected under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Hu '295.

Hu '295 teaches a process of producing nanosize particles (Column 4 Lines 4-9) wherein an aqueous solution of a zirconium chloride salt and a titanium chloride salt of a total concentration of about 0.005 to about 0.5 M are mixed (Claims 1, 2, 4, 13, 16, 19, 22 and Column 6 Lines 22-31), adding a dispersant—including 0.002 g/cm³ hydroxypropyl cellulose (Column 6 Lines 45-52)—adding an organic solvent—including those selected from the group consisting of methanol, ethanol, isopropanol, n-propanol, tert-butyl alcohol, n-butanol, and glycerol in ratios of from 0.1/1 to 10/1 solvent/water (Claims 6, 9, 15, 21, 23 and Column 6 Lines 33-44)—and incubating the mixture in an oven at temperatures of from about 20°C to about 120°C and times of from about 1 minute to 72 hours (Claims 17, 24 and Column 2 Lines 54-62).

Since Hu '295 teaches the same process and composition as claimed, one of ordinary skill in the art at the time the invention was made would have expected that the spherical nature, interparticle nanostructure and properties of the Hu '295 composition would inherently be the same as claimed.

Where applicant claims a composition in terms of a function, property or characteristic and the composition of the prior art is the same as that of the claim but the function is not explicitly disclosed by the reference, the examiner may make a rejection under both 35 U.S.C. 102 and 103. "There is nothing inconsistent in concurrent rejections for obviousness under 35 U.S.C. 103 and for anticipation under 35 U.S.C. 102." *In re Best*, 562 F.2d 1252, 1255 n.4, 195 USPQ 430, 433 n.4 (CCPA 1977).

The applied reference has a common assignee with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention "by another," or by an appropriate showing under 37 CFR 1.131.

15. Claims 8 and 9 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Hu '295 in view of Hu 1998.

Hu '295 teaches a process of producing nanosize particles wherein an aqueous solution of a zirconium chloride salt and a titanium chloride salt of a total concentration of about 0.005 to about 0.5 M are mixed, adding a dispersant—including 0.002 g/cm³ hydroxypropyl cellulose, adding an organic solvent—including those selected from the

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group consisting of methanol, ethanol, isopropanol, n-propanol, tert-butyl alcohol, n-butanol, and glycerol in ratios of from 0.1/1 to 10/1 solvent/water, and incubating the mixture in an oven at temperatures of from about 20°C to about 120°C and times of from about 1 minute to 72 hours as detailed above.

Since Hu '295 teaches the same process and composition as claimed, one of ordinary skill in the art at the time the invention was made would have expected that the spherical nature, interparticle nanostructure and properties of the Hu '295 composition would inherently be the same as claimed.

Hu '295 does not disclose expressly the use of a microwave oven.

Hu 1998 discloses a similar process using a microwave oven to incubate the composition (¶3).

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to use a microwave oven as taught by Hu 1998 in the Hu '295 process. The motivation to do so would have been to speed-up the process (Hu 1998 ¶3).

The applied reference Hu '295 has a common assignee with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art only under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 103(a) might be overcome by: (1) a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not an invention "by another"; (2) a showing of a date of invention for the claimed subject matter of the application which corresponds to subject matter disclosed but not claimed in the reference, prior to the effective U.S. filing date of the reference under 37

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CFR 1.131; or (3) an oath or declaration under 37 CFR 1.130 stating that the application and reference are currently owned by the same party and that the inventor named in the application is the prior inventor under 35 U.S.C. 104, together with a terminal disclaimer in accordance with 37 CFR 1.321(c). This rejection might also be overcome by showing that the reference is disqualified under 35 U.S.C. 103(c) as prior art in a rejection under 35 U.S.C. 103(a). See MPEP § 706.02(I)(1) and § 706.02(I)(2).

16. Claims 8 and 9 rejected under 35 U.S.C. 103(a) as obvious over Hu 2000 in view of Hu 1998.

Hu 2000 teaches a process of producing $\text{ZrO}_2\text{-TiO}_2$ particles comprising adding hydroxypropyl cellulose to an alcohol-water solution—including alcohols selected from the group consisting of methanol, ethanol, isopropanol, n-propanol, the butanols, and glycerol at ratios of up to 1.5:1 alcohol:water, of inorganic salts—including ZrOCl_2 —at total salt concentrations of from 0.05 M to 0.1 M and incubating the mixture in an oven at from room temperature to 120°C for 1 to 48 hours as detailed above.

Since Hu 2000 teaches the same process and composition as claimed, one of ordinary skill in the art at the time the invention was made would have expected that the spherical nature, interparticle nanostructure and properties of the Hu '295 composition would inherently be the same as claimed.

Where applicant claims a composition in terms of a function, property or characteristic and the composition of the prior art is the same as that of the claim but the function is not explicitly disclosed by the reference, the examiner may make a rejection under both 35 U.S.C. 102 and 103. "There is nothing inconsistent in concurrent

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102." *In re Best*, 562 F.2d 1252, 1255 n.4, 195 USPQ 430, 433 n.4 (CCPA 1977).

Hu 2000 does not disclose expressly the use of a microwave oven.

Hu 1998 discloses a similar process using a microwave oven to incubate the composition (¶3).

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to use a microwave oven as taught by Hu 1998 in the Hu 2000 process. The motivation to do so would have been to speed-up the process (Hu 1998 ¶3).

Conclusion

17. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

US 4,970,182
US 6,264,912

11-1990
07-2001

Shirasaki
Hu

18. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Timothy J. Kugel whose telephone number is (571) 272-1460. The examiner can normally be reached Monday-Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Randy Gulakowski can be reached on (571) 272-1302. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

19. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for

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published applications may be obtained from either Private PAIR or Public PAIR.

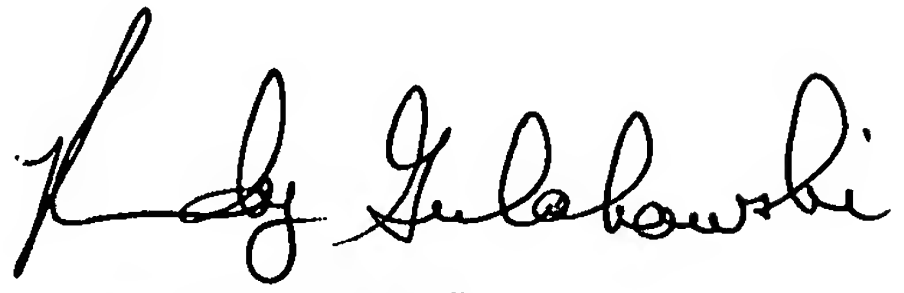
Status information for unpublished applications is available through Private PAIR only.

For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should

you have questions on access to the Private PAIR system, contact the Electronic

Business Center (EBC) at 866-217-9197 (toll-free).

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